DEPARTMENT OF DEFENSE ECOSYSTEM MANAGEMENT POLICY EVALUATION

Edited by John Fittipaldi and John Wuichet
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Army Environmental Policy Institute

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ABSTRACT

DoD announced the implementation of an ecosystem management approach for the management of installation lands in a 1994 Policy Memorandum from the Office of the Under Secretary of Defense (OUSD). The installation Integrated Natural Resources Management Plan (INRMP) is the tool for implementing ecosystem management. To date, there has been no retrospective review across DoD of implementation of ecosystem management. The Legacy Resource Management Program and Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health (DASA(ESOH)) supported the Army Environmental Policy Institute (AEPI) in studying ecosystem management implementation and providing recommendations for improvement strategies and adjustments to current DoD ecosystem management policy and Service guidance.

Without this examination, subsequent policy expressions by senior leadership will lack a sound basis. The goal of this study is to provide insights into the level of ecosystem management implemented across the military Services. The objectives include performing a gap analysis of the individual military Services' conservation policy, regulations, and guidance to determine if they carry through the requirements set out by DoDI 4715.3; developing a protocol to evaluate ecosystem management implementation; and applying the protocol through case study.

EXECUTIVE SUMMARY

The Department of Defense (DoD) identified ecosystem management as its land and water management approach of choice in the mid-1990s. However, until now no retrospective study has been conducted to determine how effectively ecosystem management policy is implemented.

The goal of this study is to provide insights into the level of ecosystem management implemented across the military Services. Objectives included performing a policy gap analysis of the individual military Services' conservation guidance and regulations to determine if they carry through the requirements set out by DoD Instruction, *Environmental Conservation Program* (DoDI 4715.3), developing a protocol to evaluate ecosystem management implementation, and applying this procedure through case study.

After researching evaluation methods, it was determined that the study would use what is termed a multiple case version of the classic single case study. DoD's ten Principles of Ecosystem Management (DoDI 4715.3) provided the basis for interview questions used at each installation visit (i.e., case study). Two cases study per Service were conducted to give eight case studies. A policy gap analysis of the Services' natural resources regulations and guidance was used as a basis for evaluating ecosystem management.

The gap analysis found that for several key areas guidance is lacking across all the Services.

> Information or sufficient detail was lacking on (1) ecosystem management, (2) inventorying, (3) monitoring, (4) adaptive management, and (5) partnerships.

> The subsequent case study analyses found these same key areas problematic or unclear to the installation natural resources managers.

Some technical aspects of ecosystem management are poorly understood and this can become an impediment to successful implementation of ecosystem management.

> DoD ecosystem management policy is not reflected in Service-level policy and implementation guidance

> Organizational issues impede adoption of ecosystem management principles. Ecosystem management implementation requires more authority than that given to the resource managers, who are far removed from the commander and are low in the installation organizational structure.

> Ecosystem management is incorrectly viewed as a separate activity requiring its own line item in natural resources budgets. Funding non-compliance related ecosystem management projects is difficult and this hinders effective implementation.

An adequate number of staff trained in ecosystem management principles is lacking. In general, natural resources staff is few and in many cases consists of only one natural resources manager. With the breadth of responsibility needed for ecosystem management, lack of staff can directly limit implementation.

Low organizational status of natural resource managers impedes effective communication with others on the installation and in the region, and furthers reluctance among managers to partner with non-military entities in the region. Ineffective communication can also adversely impact implementation.

DoD can enhance readiness by employing ecosystem management to help enhance long-term quality of the natural resources entrusted to its care. To ensure that ecosystem management is fully implemented and integrated within the day-to-day operations of all military departments, the following policy recommendations are offered:

Promulgate and disseminate Service-level policy and guidance.

Raise Natural Resource (NR) Management Offices higher in the installation chain of command, and enhance Regional Environmental Offices' ability to support installation NR managers and connect them with others in the region.

Move closer to the goal of the DoD Instruction, where ecosystem management principles become not just special projects isolated from the rest of an installation's environmental program, but rather where they form the basis of decisionmaking at the installation level. Require proposals for new or continuing special projects to demonstrate how they will accomplish or embody the ten principles in the Instruction, and require all INRMPs, as well as the projects proposed to implement them, to demonstrate how they will support the accomplishment of ecosystem management goals and objectives.

Train staff and inform leaders at installations and Regional Environmental Offices on the principles of ecosystem management as described in the existing DoD Instruction and the recommended new Service-level policy and guidance.

Empower natural resource managers with the authority to enter into agreements with other land managing entities in the region. Installation commanders may realize that delegation of authority is in fact an exercise in authority.

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ACRONYMS

AEPI	Army Environmental Policy Institute
AFB	Air Force base
BASH	Bird Air Strike Hazard
DASA(ESOH)	Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health
DoD	Department of Defense
DoDI	Department of Defense Instruction
DPTM	Directorate of Plans, Training, and Mobilization
DPW	Directorate of Public Works
EM	Ecosystem Management
EMD	Environmental Management Division
EMR	Environmental Restoration Division
ENRD	Environmental and Natural Resources Division
EPRM	Environmental Program Requirements Module
ESA	Endangered Species Act
FORSCOM	Forces Command
GIS	Geographic Information Systems
INRMP	Integrated Natural Resources Management Plan
ITAM	Integrated Training Area Management
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
MCLB	Marine Corps Logistics Base (Barstow)
MOA	Memorandum of Agreement
NBVC	Naval Base Ventura County (Point Mugu)

NEPA	National Environmental Policy Act
NR	Natural resources
NREA	Natural Resources and Environmental Affairs
O&M	Operation and maintenance
OSD	Office of the Secretary of Defense
OUSD	Office of the Under Secretary of Defense
PAO	Public Affairs Office
RCW	Red-cockaded woodpecker
REO	Regional Environmental Office
SAIA	Sikes Act Improvement Act
SILO	Strategic Installation Learning Office
TM	Technical manual
TRADOC	Training and Doctrine Command
USFWS	U.S. Fish and Wildlife Service

1. Background

The Department of Defense (DoD) has a long history of natural resources management, which has changed over the years to keep pace with developments in that field. As the state of the science has evolved, legislation has supported improved practices and DoD and the individual Services have developed new guidance and regulations. Key support for ecosystem management appeared in the DoD memorandum on implementing ecosystem management (1994), the subsequent DoDI 4715.3, *Environmental Conservation Program* (1996), and the Sikes Act Improvement Act in 1997 (SAIA). DoDI 4715.3 provides guidance to the Services in implementing ecosystem management. It specifies that the tool for implementing ecosystem management is the installation Integrated Natural Resources Management Plan (INRMP), and the SAIA requires implementation of these plans. DoD's Principles of Ecosystem Management were first presented in the 1994 memorandum and subsequently in DoDI 4715.3, along with INRMP guidelines. A more detailed discussion of the individual Services' regulations and natural resources guidance is in the gap analysis in Appendix A.

Implementation of ecosystem management has been underway at DoD for almost ten years, but the extent of implementation has not been examined until now. Without this examination, subsequent policy expressions by senior leadership will lack a sound basis. The goal of this study is to provide insights into the level of ecosystem management implemented across the military Services. The objectives include performing a gap analysis of the individual military Services' conservation policy, regulations, and guidance to determine if they carry through the requirements set out by DoDI 4715.3; developing a protocol to evaluate ecosystem management implementation; and applying the protocol through case study.

After some research of evaluation methods, it was determined that the study would use what is termed a multiple-case version of the classic single case study (Yin 1994). The case study approach is qualitative and well suited to an evaluation of ecosystem management implementation. Such a qualitative study provides more detailed information than a purely quantitative analysis. Also, the intent was not to numerically rate installations or the Services. Such an activity would not provide any useful information and could be misinterpreted and consequently damaging to installation conservation programs.

2. A Case Study Approach

Case study research has a history of intense use and intense misuse (Tellis 1997). Although primarily used in the social sciences, the natural sciences are increasingly using the case study approach. There are both problems and benefits associated with this approach. A major criticism is that if the study depends on only one or a few cases, it is incapable of providing general conclusions (Tellis 1997). However, Yin (1993) and others argue that as long as each case study meets the specified objectives and goals, even a single case study can be acceptable. In support of the case study methodology, many researchers feel that it can uncover important information that is obscured when using a purely quantitative method (Tellis 1997). Also, case studies tend to be more flexible than other forms of research methods. Case studies can follow single or multiple-case designs. Multiple cases strengthen the results and increase confidence in those results (Tellis 1997).

According to Soy (1998), there are six general steps in a case study. These steps were applied to this evaluation.

- Determine and define the research questions (DoD's Principles of Ecosystem Management was the basic guidance document (DoDI 4715.3, Enclosure 6)).

- Select the cases (military installations) and determine data gathering and analysis techniques.

- Prepare to collect the data.

- Collect data in the field (site visits, interviews, installation document and information review).

- Evaluate and analyze the data (gap analysis, interviews, document review, internal and external review).

- Prepare the report (DoD Ecosystem Management Policy Evaluation).

Establishing the reliability and validity of a case study is essential. Ways to achieve this include developing a protocol and obtaining outside review of case study drafts (Yin 1994). The following sections discuss the protocol and outside review used in this study.

2.1   Protocol Used for the Study

The main goal of the study is to determine how fully the military Services (Army, Navy, Air Force, Marine Corps) are implementing ecosystem management. To achieve this goal the study used the following protocol:

- Perform a gap analysis of Service natural resources regulations, guidance, and guidelines (Appendix A).

- Develop forty questions to be used as discussion points for the case study interviews (Appendix B).

- Select eight military installations for the site visits and case studies.

- Conduct site visits to interview installation staff.

- Evaluate and analyze information.

- Assess the success of implementation of ecosystem management using the site visits, interviews, installation documents and information, and "existing knowledge."

This study refers to the above bullets as the DoD Ecosystem Management Evaluation Package. The gap analysis (Appendix A) provides a basis for evaluating ecosystem management across the Services. The main finding of the gap analysis is that some key ecosystem management components are consistently lacking or are poorly addressed across the military Services' guidance; specifically, descriptions of ecosystem management, monitoring, adaptive management, partnering, and inventorying. As reported in the gap analysis, the absence of or lack of reference to these key elements in the individual Services' implementation regulations or guidance documents makes it difficult for natural resources managers in the field to have a clear understanding, frame of reference, or sense of direction about their individual Service's intent for ecosystem management. This also leads to difficulties for the natural resources manager in seeking and securing funding and in gaining command support for projects and actions related to these key elements. It is not surprising that the case studies found these components problematic for managers when implementing ecosystem management (see section 3.1).

Forty interview discussion points/questions (Appendix B) were used at each installation to gather data for the evaluation. The questions are centered around DoD's ten Principles of Ecosystem Management (DoDI 4715.3, Enclosure 6, 1996) and are intended to investigate the challenges to implementing ecosystem management that installations face. In addition, there were some initial queries to gain installation background information.

Interviews conducted at the eight installations typically spanned two days with the participation of two to eight installation staff. The study team conducting the interviews comprised two to four individuals. The number of installation staff participating in the interviews varied with the size and organizational structure of each installation _ larger installations with more and larger programs tended to have more participants. Usually there were at least one or two installation points of contact involved throughout the entire interview and site visit, and other staff joined the interview as specific questions arose requiring their expertise and as staff schedules permitted. In general, all installation staff seemed enthusiastic about the interviews and were keen to participate.

The interviews included general discussion, discussion to address the interview questions, and a tour of the installation identifying key ecosystem management

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practices. Interviewees received the interview discussion points in advance. The interviewees included natural resources, forestry, fish and wildlife, threatened and endangered species, and environmental managers but also military training and range management personnel whenever possible . The interviews were relatively informal and conducted in a group format. Some installation interviews followed the discussion points item by item, others were more a free-form discussion. In the latter case, the discussion points were reviewed before the close of the site visit to ensure that each topic had been addressed. Follow-up telephone conversations and email communications were conducted with all of the installations included in the site visits.

In addition to the interviews and site tours, relevant documents provided a source of information for the study. During the site visits, pertinent installation documents were available to the study team for review. The full variety of documents reviewed in support of this study came from more than the eight installations visited and included INRMPs, Environmental Assessments, Environmental Impact Statements, annual plans, master plans, installation organization charts, and various other installation documents (for example, range management, forest management, wildlife management, and erosion control plans).

The inclusion of particular installations in this study depended primarily on their nomination by each Service headquarters natural resources staff and on the willingness of the installation staff to participate. The chosen installations represent all the military Services (Army, Navy, Air Force, Marine Corps). The sites and a brief description are listed in table 2.1.

TABLE 2.1 LIST OF SITES CHOSEN FOR ECOSYSTEM MANAGEMENT EVALUATION PROJECT		
Installation Name	*Ecosystem Type (Bailey 1994)*	*Attributes*
Fort Stewart, Savannah, Georgia	Southeastern Conifer, Middle Atlantic Coastal Forests	Isolated site, high profile endangered species, combat training facility, ~280,000 acres
Tinker Air Force Base (AFB), Oklahoma City, Oklahoma	Central Forest Grassland Transition Zone	Primarily urban setting, no endangered species, maintenance facility, ~5,000 acres
Fort Knox, Kentucky	Eastern Broadleaf Forest Central U.S. Hardwoods	Numerous low profile endangered species, combat training facility, ~109,000 acres
Naval Base Ventura County (NBVC) Point Mugu,	California Coastal Chaparral Forest Shrub Province	Endangered and threatened species, air field and bombing facility, land (~4,600 acres) and sea

California		test range (~36,000 mi^2)
Marine Corps Logistics Base (MCLB) Barstow, California	American Semi-desert and Desert Province	Isolated site but ecosystem initiatives in Mojave Desert, high profile endangered species, logistics facility, ~5,000 acres
Marine Base Quantico, Virginia	Outer Coastal Plain Mixed Province	35 miles south of Washington, D.C. in Prince William County, Virginia, ~60,000 acres
Naval Submarine Base Kings Bay, Georgia	Outer Coastal Plain Mixed Forest Province	Among the newest installations in the US, construction starting in 1982; ~16,000 acres.
Robins Air Force Base, Georgia	Southeastern Mixed Forest Province	100 miles south of Atlanta, Georgia, spanning approximately 8,700 acres

As an internal check, a semi-quantitative evaluation was used to verify that the conclusions drawn overall and for each site were indeed based on the information gathered and the responses to the questions (Appendix C). This check evaluation grouped the responses to the discussion points according to whether they related to goals, strategies, or procedures. The data from each individual installation are not included as part of this study. To include them would imply that a purely quantitative approach was used to compare installations but this was neither the case nor the intent. To prevent attempts at such a quantitative comparison, the evaluation table in Appendix C presents average scores for all the installations visited. These scores display trends and support the analysis presented in this report.

Summary trip reports were prepared for each site visit (Appendix D). Analysis of the case study information is presented in this evaluation report and is also summarized under each of the individual case studies (Appendix E). The case studies discuss the issues from each installation relevant to ecosystem management implementation and highlight the successes and problems facing the individual installations. However, the information that is most relevant to the study is the review and analysis across the Services extrapolated from the eight representative installations and also from the other information sources. It was not the intent of this study to quantitatively evaluate individual sites. Rather the intent was to develop an overall picture of how ecosystem management is implemented across DoD, to identify any particular trends, and to propose appropriate policy intervention. The study team is aware of the limitations of generalizing across the Services but believes that the gap analysis and the evaluation of this representative group of installations do allow recurring DoD-wide issues to be brought to light.

2.2   External Review

The protocol, case studies, and the final report were reviewed to ensure and enhance the quality of the study. The case study participants reviewed their respective case

studies. Yin (1994) recommends having the subjects of the study review the case studies to assure their validity. To further ensure objectivity and quality of the study, Drs. Cheryl Contant and Bryan Norton of the Georgia Institute of Technology reviewed the protocol, final case studies, and final evaluation package.

3. Ecosystem Management Implementation Analysis across DoD

Site visits, interviews, and installation document reviews revealed common trends across the Services in the status of ecosystem management implementation. The issues or themes affecting successful ecosystem management are discussed and analyzed below. The issues can be considered common challenges or impediments that installations face when implementing ecosystem management. Overall, as the DoD's approach to land management, ecosystem management has a good start primarily due to the requirement that installations prepare INRMPs _ DoD's tool for implementing ecosystem management. However, a similar set of issues hinders successful implementation of installation INRMPs across all the Services. As presented in this report, some of the issues are not new to natural resources managers or even to most installation staff.

3.1 Aspects of Ecosystem Management

The ten Principles of Ecosystem Management first appeared in a 1994 DoD memorandum and were subsequently published as principles and guidelines in an enclosure to DoDI 4715.3, *Environmental Conservation Program* (DoDI 1996). (The Principles are reprinted in Appendix B following the list of Case Study Discussion Points.) DoD's principles and guidelines address key components of ecosystem management that are generally acceptable to academicians and practitioners alike, and they provide guidance pertinent to installation managers. The principles and guidelines can be grouped into three key elements: goals, strategies, or procedures. DoDI 4715.3 also provides a DoD definition of ecosystem management as "A goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural process; is cognizant of nature's timeframes; recognizes social and economic viability within functioning ecosystems; is adaptable to complex changing requirements; and is realized through effective partnerships among private, local, State, tribal, and Federal interests" (DoDI 1996).

The ecosystem management policy states that installations should develop a shared vision of their local region. "All interested parties (Federal, State, tribal, and local governments, nongovernmental organizations, private organizations, and the public) should collaborate in developing a shared vision of what constitutes desirable future ecosystem conditions for the region of concern. Existing social and economic conditions should be factored into the vision, as well as methods by which all parties may contribute to the achievement of desirable ecosystem goals." Developing such a vision necessitates being cognizant of the installation's regional setting and working with surrounding land managers (Federal, State, private, etc.) to collaborate on developing a regional vision that considers ecological, economic, and social factors of the regional landscape. From this collaboration, the installation can then develop a set of goals and objectives that strives to achieve the regional vision and the installation mission.

Although such a regional vision is ideal, this study found many bases do not take a regional perspective to ecosystem management. Numerous reasons exist as to why — regional visions require partners, management endorsement, time, and money, all of which are limited on an installation. Partnerships involve two or more organizations or interests collaborating on a program, initiative, or some similar combined action. Some installation staff are not aware that DoD's ecosystem management policy requires a regional perspective. DoD and individual Service policies and guidance that address ecosystem management are not always well distributed throughout the Services. Even with these challenges, some installations realize the importance of a regional perspective and do approach management from a regional perspective, even if there is no locally agreed upon vision. In these cases, the natural resources managers have adopted a previously-developed or accepted regional vision (e.g., Tinker AFB) or they use historical information about local ecosystems (e.g., NBVC Point Mugu) to perform management with a regional perspective.

Some bases are unable to acquire partners that may help them develop a regional vision and associated management goals and objectives. Bases are often isolated on the landscape, although many are becoming less remote and less isolated because of the spread of urban and suburban development. The sheer size of larger installations can also make them somewhat isolated as they are self-contained, often fenced-off, and have historically looked inward rather than outward. Most installations contribute positively to their local communities by providing economic opportunities (employment, support services); allowing agricultural leasing, grazing, and/or timber harvest; or by allowing hunting, fishing, and other recreational opportunities. But beyond this, interaction between installations and their neighbors was neither expected nor conducted. This attitude has been difficult to change by both installations and the local communities, but it is getting more attention as encroachment becomes a significant issue. Some installations are taking actions to identify dedicated staff as liaison with the local communities but otherwise, natural resources managers undertake partnering and joint efforts on their own initiative and frequently at their own expense (time, effort, and money).

Fort Stewart, near coastal Georgia, is one such installation that can be regarded as somewhat isolated due to its relative size (over 279,000 acres). Although close to the Savannah and coastal resort area, rural farming and forestry surround most of the installation. . As such there is little interest, and perhaps little perceived need, by the local community to develop a regional vision for land management. As a result, Fort Stewart lacks regional partners for ecosystem management. Fort Stewart is an active and significant contributor to the red-cockaded woodpecker[1] recovery program and contributes significantly to this initiative; however, the Endangered Species Act drives this initiative rather than an independent local or regional initiative.

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[1] The red-cockaded woodpecker, *Picoides borealis*, is listed as an endangered species and is protected under the Endangered Species Act (ESA) of 1977, as amended. Military installations with known federally listed threatened or endangered species are required by the ESA to manage for the recovery of the species.

Installations in highly developed areas often face an equally difficult task when trying to develop a vision for the installation and establish appropriate goals and objectives. For example, Tinker AFB acknowledges the importance of regional ecosystem management but is limited by its surroundings — urban and suburban development that has all but eliminated the natural prairie grasslands. Despite this, the natural resources manager at Tinker AFB has developed a vision for the installation that includes reestablishment of native prairie grasses, albeit on a limited scale. Development can also be in the form of intensive agriculture or forestry. For example, crop farms surround most of NBVC Point Mugu and there is little interest in the development of a regional vision.

Partnerships to create a regional vision require commitment and compromise, which in turn requires dedication of funds and staff. However, development of a vision for ecosystem management and development of the associated goals and objectives for realizing that vision are not high on the priority list of any installation budget. The requirement for each installation to have and implement an INRMP did provide some impetus to fund the drafting of the INRMP itself but many INRMPs lack a clear vision, and some do not include goals and objectives for ecosystem management. Even when there are clear, prioritized goals and objectives, there is usually little funding available to implement supporting projects unless they have a compliance component.

Across the various Services, it is more likely that an installation has developed goals and objectives for installation-based ecosystem management rather than a regional vision. Goals and objectives are critical to ecosystem management and it is imperative that they are documented in the INRMP. While this may seem basic, the authors' reviews of more than fifty INRMPs conclude that many installations lack clear ecosystem management goals and objectives. Clearly articulated goals and objectives in the INRMP allow responsible and interested parties to have a clear understanding of the installation's intent for ecosystem management.

In the absence of clear goals and objectives, adaptive management cannot be implemented. However, monitoring and adaptive management are also areas where there is a lack of guidance from DoD and the Services and a lack of understanding at the installation level. DoDI 4715.3 does not include a definition of adaptive management, nor does it define monitoring in the context of ecosystem management and adaptive management. Monitoring must be an integral part of ecosystem management so that progress is made toward the desired goals and objectives. Monitoring should be used to detect when progress is not being achieved and when adaptive management is needed to get a particular management action back on track. However, with the exception of compliance monitoring for threatened and endangered species or for water quality, installations do not usually conduct monitoring of natural resources or related environmental parameters. Most installation natural resources managers indicated their interest in developing a monitoring program; however, it was not clear how such a program would be funded. The priority for funding remains with Class I "must funds" and very few natural resource activities, including natural resources monitoring, are interpreted as compliance-related.

For a DoD definition for adaptive management, one can refer to *Conserving Biodiversity on Military Lands* (Leslie et al. 1996); however, it states that for the purposes of that handbook the terms ecosystem management and adaptive management are used interchangeably. This does not help the natural resources manager identify DoD's intentions regarding adaptive management. Most installation staff consider that they do practice adaptive management because they are adept at responding at short notice to needs and mission changes. This is not adaptive management and may be better termed reactive or ad hoc management. Adaptive management is a management decision process. As explained in Leslie et al. (1996), "Rather than prescribe a management scenario, the manager working in an adaptive fashion tests possible solutions to problems in a scientific, experimental way, complete with controls." To implement this, one has to develop a monitoring program to validate or reject a given solution. For a DoD perspective on the links between ecosystem management, monitoring, and adaptive management refer to the handbook, *Resources for INRMP Implementation: A Handbook For Natural Resources Managers* (Legacy 2001).

3.2   The Organizational Challenge

Today's installation natural resources manager is an integrator of diverse goals and objectives and the key implementer of ecosystem management. This greatly- expanded role involves potentially far-reaching responsibilities. In the ideal situation, the natural resources manager's role involves on- and off-post (local and regional) planning components; integration with on- and off-post plans, activities, and groups; development of long-term land management strategies; and implementation of activities. However, within the organizational structure of an installation, the natural resources program is typically low in the hierarchy. This low organizational status of the natural resources group is likely the result of its historical support role.

In the past, the natural resources staff had a narrowly focused support role such as directly managing forests for the contribution of forest products to the local and national economy (foresters), or managing fisheries and hunting activities to benefit the military and local communities (wildlife managers). This pursuit of isolated management objectives was outlined in a series of multi-service Technical Manuals (TM) developed in the early 1980s (TM 5-630 Land Management; TM 5-631 Natural Resources Forest Management; TM 5-633 Fish and Wildlife Management; and TM 5-635 Outdoor Recreation and Cultural Values). These individual guidance documents do not reflect the responsibilities of today's managers, who must have skills in these areas as well as in program administration. One can point to some improvement in the status of natural resources programs within an installation's organizational structure — ten to twenty years ago most installations did not have a recognizable natural resources program. In some cases the natural resources programs were under the Civil Engineering Department until the creation of separate Environmental Departments; however, their status has generally remained low.

During the case study interviews, the project team did not introduce any discussion points addressing the organizational structure of an installation, beyond how the installation is organized and where the natural resources program fits (see Case Study

Discussion Points, Appendix B.) However, the issue of the installation's organization as an impediment to effective management was raised during every case study site visit. In all cases, the natural resources staff voiced their concern and sometimes frustration at not being able to accomplish what they are charged to do because of their program's organizational status. Several interviewed staff expressed that ecosystem management implementation requires more authority than that given to the resource managers, who are far removed from the commander and are low in echelon.

This low echelon means that the natural resources managers, who are the staff primarily responsible for implementing ecosystem management, are not included in the necessary decision-making, planning, and operational meetings and activities, or they are brought in too late to these processes to be effective. Ecosystem management is a proactive approach to land management, but in many cases the natural resources managers must operate in a reactive (not adaptive) mode.

It was frequently reported that even when the natural resources program staff are included in installation meetings, they may not be allowed to actively participate in the meetings. Usually the environmental branch or division chief or others up the chain of command interact at these installation environmental meetings. Most environmental divisions house numerous program areas (NEPA, natural resources, waste management, compliance, pollution prevention, etc.) and the division chief may be hard pressed to accurately report and interact on behalf ecosystem management.

Another impediment related to an installation's organization is the difficulty natural resources managers may face in gaining access to certain areas of the installation. Natural resources managers must conduct or at least supervise ecosystem management activities throughout the entire base. However, in some cases the cantonment areas and ranges are off-limits to the natural resources managers and there are no qualified staff managing these areas from an ecosystem standpoint. This leads to large gaps in an installation's overall ecosystem management. Frequently, the cantonment area is managed by a contractor-operated grounds maintenance crew and there are usually few opportunities for the natural resources staff to influence the management activities (such as mowing schedules, establishment of low maintenance areas, use of native species, control of exotic species, irrigation schedules). In part because of the organizational structure of installations, the grounds maintenance crews are rarely supervised by an installation natural resources specialist, and the natural resources staff are usually not involved in either the development or award of the contracts for grounds maintenance services.

More critical than the need for supervision of cantonment areas is the need for natural resources support in managing the ranges and training lands — a breakdown in management of range and training areas will eventually impact range sustainability and mission readiness. Some installations have mechanisms in place to ensure that there is good coordination between range management and the natural resources staff. One such installation is Fort Stewart, Georgia, where the range and natural resources staff work together through a combination of daily coordination and participation in regularly scheduled meetings to discuss upcoming range activities and how range activities may

interact with endangered species compliance and INRMP projects. The range division's ITAM[2] staff includes a biologist and field technicians who coordinate ITAM and range support activities with the natural resources program. Another collaboration between the natural resources staff and range division at Fort Stewart is that they share and maintain a common Geographic Information Systems (GIS) database, with the different groups having responsibility for maintaining their designated data layers (range, fish and wildlife, threatened and endangered species, forestry). Despite this coordination between range and natural resources, there is still a sense that the organizational structure works directly against the natural resources staff's abilities to work to their maximum efficiency and effectiveness in fully implementing ecosystem management.

Unfortunately, not all installations have such open communication between the natural resources managers and the installation organizations they support. In a few instances, there are severe limitations placed on the natural resources staff concerning access to range and training areas for routine management activities. This not only impacts the implementation of INRMP projects but in some cases will eventually impact the sustainability of the ranges and mission readiness. With the increasing training demands placed on a decreasing number of installations, it is critical that the ranges, which often comprise the majority of an installation's acreage, are an integral part of the installation's ecosystem management. In some situations, however, management of the ranges and training areas is not yet integrated with installations' overall goals and objectives for ecosystem management. Limited access to training areas for routine natural resources management, combined with a lack of range management and restoration activities, will lead to degraded ranges. Considerable time and effort will be required to return such ranges to the point where installation ecosystem management goals and objectives are achievable.

In some cases, the natural resources program may not have access to areas under the control of installation tenant groups. This is usually not a significant problem as the tenant areas are typically of limited acreage and have few natural resources. Again, the relatively low status of the natural resources manager within the installation's structure frequently means that they have little influence over tenant activities that may impact the environment. The natural resources staff at Tinker AFB tackles this issue by adopting the role of advisor to the tenant groups as well as to other installation organizations. Their intent is to influence the tenants and the installation groups to use their own environmental funds to implement activities that are supportive of the installation's

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[2] The U.S. Army Construction Engineering Research Laboratories (CERL) developed Integrated Training Area Management (ITAM) as a comprehensive land management approach for Army installations and it remains today a predominantly Army initiative. ITAM is funded from Army Headquarters (supervised by the Office of the Deputy Chief of Staff for Operations and Plans with resource allocation by the Directorate of Training) down through the major commands to the ITAM installations' range divisions. ITAM funding requirements are based on a categorization of the installations that ranges from I to IV, with category I installations having the most critical training mission and significant environmental sensitivity to missions. ITAM's four components include two that require close coordination and cooperation concerning INRMP implementation — Land Rehabilitation and Maintenance (LRAM), and Land Condition Trend Analysis (LCTA). The former is basically a land restoration program and the latter is a land condition monitoring program.

overall ecosystem management goals and objectives, or at a minimum, are not counterproductive to meeting the installation goals and objectives. Educating the tenants and installations organizations about implementation of the INRMP is key to their success as advisors.

A lack of authority goes along with the low organizational status of natural resources programs. This lack of authority can also impact the abilities of natural resources staff to work effectively, especially when coordinating for off-installation or for regional efforts. In some cases, a meeting with an installation neighbor may be impeded by the chain of command simply because of the number of levels that have to give approval. It is important that the natural resources manager has flexibility in interacting with neighbors and potential partners and most managers fully understand the necessary limitations when interacting with outside groups. However, inflexibility on the part of the installation chain of command hampers developing and maintaining positive interactions with neighbors.

Natural resources programs with high-profile endangered or threatened species are less hindered by the organizational status. Installation commanders are aware of endangered species management and compliance issues and of the public's interest in certain protected species. When there are high-profile endangered species on post, there is frequently more support for the program from command, and the higher public interest often heightens the overall awareness about natural resources management both on- and off-installation.

3.3   Funding

Funding limitations are not new to installation programs, including natural resources. However, ecosystem management is under-funded and cannot be effectively implemented. Many personnel consider ecosystem management an unfunded initiative, albeit an important policy. Support for INRMP implementation should come from installation operation and maintenance (O&M) funds. Installations that collect fees for hunting and fishing can supplement natural resources funding for fish and wildlife management using these funds once the costs of the fish and hunting programs have been met. Installations with reimbursable forestry programs can use net proceeds, although generally small, to support installation forest management after costs are met and state entitlements awarded. However, many installations do not collect hunting and fishing fees, and relatively few installations have a reimbursable forestry program. As a result, O&M funds are the primary means available to the natural resources manager to support ecosystem management. Although with limited military department application, installations with active ITAM programs can also provide some support to the installations' overall ecosystem management through the LRAM and LCTA components (see footnote 2). However, the year-to-year funding for ITAM is not under the control of the natural resources program and unless ITAM support for range management is identified as a compliance item (for example, ITAM is a mitigation requirement associated with NEPA compliance, such as the environmental assessment for the INRMP), ITAM may not be a reliable source of funding support for range management. Fort Knox has seen shortfalls in ITAM support for LRAM and LCTA over the past

several years and there are insufficient O&M funds available to make up for this shortfall. The result is that many ITAM projects are idle and the environmental staff is only able to address the most critical management needs.

The Environmental Program Requirements Module (EPRM) is the DoD standard and uniform tracking system[3] and is intended to help environmental managers program, budget, and track environmental requirements. Environmental requirements, including projects and support for ecosystem management, are funded depending on the class of each requirement. Classes applicable to environmental projects range from Class I to Class III (Class 0 funding is for recurring costs such as personnel salaries and administrative costs, and others). The EPRM was originally developed as an aid to maintain compliance and it is still strongly driven by compliance requirements with most Class I ("must fund" current compliance) and some Class II (maintenance requirements) project requirements being funded. Ecosystem management projects, for the most part not perceived to be compliance related, fail to be designated above Class III (enhancement actions beyond compliance) and therefore fail to be funded. The natural resources managers must use creative means to gain O&M funds for ecosystem management initiatives, or must turn to alternative sources of funds, including non-DoD funding. However, frequently there are restrictions on either applying for alternative funds (federal agencies may not qualify) or receiving funds from alternative sources. Identifying and applying for alternative sources of funding to support INRMP implementation projects is time consuming and there is no guarantee of success, so most managers are careful to limit their efforts.

Installations with threatened and endangered species management requirements are more successful in having their budget requests funded because of the need to comply with the Endangered Species Act. Sometimes, management for a threatened or endangered species may benefit the broader installation goals and objectives for ecosystem management. In these cases, the natural resources managers usually try to spread the "benefits" of these somewhat reliable threatened and endangered species management funds to other non-compliance natural resources initiatives.

However, there are instances where endangered species management does not fulfill ecosystem management requirements and may in fact compete with management for other species or with ecosystem goals and objectives. The funding of compliance-driven threatened and endangered species management and the lack of funding for non-compliance related ecosystem management actions (i.e., they do not qualify as Class I, Class II or even Class III) can lead to very lopsided management. Ecosystem management requires a holistic approach to management but most threatened and endangered species management is still based on a species-specific approach and

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[3] The Environmental Program Requirements Module, developed by Defense Environmental Security Corporate Information Management, was intended to replace the current systems used by the different component services such as the Air Force WIMS A-106 module or the Marine Corps CompTRAK. Although initially designed to be an aid in maintaining compliance, DoD enhanced the EPRM system to assist overall management of environmental programs and for monitoring progress in environmental stewardship.

management at installations with high-profile threatened and endangered species tends to follow management for those species rather than ecosystem management.

Many budget requests for natural resources management support are turned down year after year. Managers who continue to request funding levels greatly exceeding the dollar amounts that are approved each year are often looked upon unfavorably. Over time, natural resources managers may become discouraged and cease to request the actual budget needs. In other words, some installations do not budget for projects unless they know they will get funding. In the long term, this will significantly impact the ability to effectively implement ecosystem management because of diminishing returns — if funding requests are routinely reduced to match anticipated funding levels rather than reflecting true funding requirements, then the natural resources manager will find it more difficult each year to meet that year's needs and to substantiate any future requested increase in funding requirements. Most INRMPs reviewed as part of this study revealed that project prioritization and funding requirements are areas that are frequently not included in INRMPs. In general, natural resources managers are somewhat hesitant to include this level of detail in INRMPs because they understand that they may not be successful in securing funding for even high priority projects and this could reflect negatively on the natural resources program. In some cases, projects and management activities are left out of INRMPs because they are not likely to get funded or the INRMP has a better chance of getting approved and signed by command without these "un-fundable" projects. This again hinders ecosystem management since it is difficult to acquire funding for projects that are not identified in the INRMP.

3.4   Staff Support

Understaffing is a common problem for both installation environmental and natural resources programs. In several cases, a lack of sufficient staff was voiced as a more critical issue than a lack of funds and it appears that in some cases ecosystem management implementation is being limited due to understaffing.

Small installations (less than twenty thousand acres) may have only one installation natural resources manager or, depending upon the circumstances, there may be no on-post manager, with natural resources management conducted by a regional manager or a manager at the major command level. Some significantly large installations also may only have one natural resources manager. Although increasing installation size does not necessarily correlate to increasing staff requirements, in most cases one natural resources staff is not enough to carry out the extensive requirements of ecosystem management. Sound natural resources management is the basis of ecosystem management but comprehensive monitoring, adaptive management, data management, data analysis, application of new technologies, partnering/outreach, and a continuous refinement of goals and objectives are all critical components. Even if one individual is skilled in all these areas, that person would be hard pressed to meet these extensive responsibilities while still being able to respond to day-to-day demands.

Understaffed natural resources programs find they can respond to short-term initiatives and immediate demands, but longer term ecosystem management initiatives are

conducted piecemeal and only as time permits. Today's installation managers must contend with far more administrative requirements and demands for their time than previously, and many expressed concern that they were unable to spend sufficient time in the field or directly on their natural resources management responsibilities.

Many installations have undergone or anticipate they will soon undergo the Commercial Activities Program review (commonly referred to as the A-76 process after the Office of Management and Budget Circular A-76). The A-76 process can potentially impact all military civilian employees as the various installation programs are reviewed to determine which are appropriate to be contracted out as opposed to those that will remain as government civilian supported. There is a general opinion that merely the threat of the A-76 process decreases morale on installations. Even those installations that have, as the staff describe it, "survived the A-76 process" experience a decline in morale to some extent. Installation programs that survive A-76 basically do so by demonstrating that it is more economically sound to retain the program as a government civilian supported function than to contract out the operation of the program. To succeed in this typically means that programs must become streamlined and must operate more efficiently. In reality, this means that some staff will lose their jobs and remaining staff must take on added responsibilities, usually with no additional support or compensation. So even if a program "survives" the A-76 process, morale can remain low because staff are overworked and overwhelmed.

The greatest concern voiced by the natural resources managers about the A-76 review process was not concern about job security but concern about the impact outsourcing will have on the stewardship of installation lands. Ecosystem management requires long-term, regional scale thinking and management. Installation natural resources managers are highly dedicated professionals and they have concerns that contractor staff will not perform ecosystem management with such a vision. Typically, contractor staff do not stay in their positions as long as a full-time civilian personnel, and indeed, most installation support contracts may not even span the five years of the first INRMP let alone management actions spanning ten or more years. Contractor support staff may also lack the necessary savvy about the installation natural resources. Many natural resources and environmental managers interviewed during the case studies had been involved in installation management in excess of ten years, and these individuals are the keepers of a wealth of installation information that would be lost if their positions were outsourced. Another concern about staffing is the lack of qualified staff available for hire to support installation ecosystem management. Not only do today's natural resources managers have to be proficient in a full range of ecosystem and natural resources management practices, they must also be proficient in the administrative aspects of land management and have a sound knowledge of installation operations. Recent university graduates may have strong academic credentials and have been trained in the principles of ecosystem management, but installation natural resources management requires considerable on-the-job training. Once trained, and with a few years of experience, these individuals are frequently sought after by other federal land management agencies. The relatively low salaries of installation natural resources staff, and the relatively limited career advancement opportunities at an installation, make it difficult for natural resources programs to retain young, talented individuals.

In most cases, the natural resources programs can supplement their staff by acquiring contractor services and contract support staff (e.g., field technicians, GIS support, laborers, equipment operators) to assist in project implementation. However, this is frequently not efficient because contractor support staff commonly have a high turnover rate due to the lack of job security and due to salary competitiveness between contractor firms. Although these staff may directly support the natural resources program, the natural resources manager has little impact on the working conditions of contractor-supplied staff because these staff ultimately report to their employer, the contractor firm. Effective natural resources management requires an in-depth knowledge of the installation's natural resources, its terrain, and the various restrictions and requirements that come with working on a military installation. Contractor support staff typically lack this detailed knowledge about the installation and require considerable training before they become proficient. A high turnover of contract staff makes it difficult for the natural resources manager to rely on this type of support for much more than basic field support or data management activities. Unless specific project components can be identified, contract support staff may not be able to provide the necessary broad vision and appreciation for implementing an ecosystem management approach.

3.5   Communication

Many degrees of internal (on-installation) and external (off-installation) communication exist at installations. Communication on installation natural resources programs ranges from little-to-no knowledge to full acceptance and respect for natural resources programs. MCLB Barstow's natural resources program, for example, has established strong lines of communication between the natural resources manager and the commander, range manager, and civilian and military personnel and their families. The presence of the federally listed threatened desert tortoise (*Gopherus agassizii*) and participation in regional partnerships for desert management are the drivers for this communication. The presence of a high-profile endangered species on an installation can facilitate education of base personnel and installation neighbors on the natural resources program, and this in turn can facilitate communication.

Much of the communication difficulties encountered by natural resources managers seem to stem from the program's placement in the installation structure (refer to section 3.2). The relatively small size of MCLB Barstow and its relatively simple organizational structure probably enhance its ability to maintain good internal communications. However, for large installations with extensive installation support programs, the natural resources program is well down the organizational structure and this makes communication difficult with other installation groups and programs. Most managers felt that a more elevated position in the installation hierarchy and one with some authority would improve communications both on and off installation. For most installations, improved communications would lead to more efficient natural resources programs that operate proactively and are able to interact with the appropriate levels of the installation hierarchy and provide timely support.

Increased communication authority for natural resources managers would also benefit installations. In some cases, the natural resources program does not have the authority to communicate directly with certain installation groups that may be affected by natural resources or that may have significant impacts on natural resources. This inability to communicate directly greatly inhibits effectiveness and can be counterproductive to having an educated and supportive installation command and community.

One would expect installation public affairs offices (PAOs) to be involved in supporting communications for ecosystem management; however none of the visited installations indicated they use PAO support to help with communications. With regards to ecosystem management, the title "public affairs office" is somewhat of a misnomer. Installation PAOs are the commanders' representatives to the media and the public for installation events. The PAO is not intended as a proactive liaison with the general public — it relays specific information when needed and as directed by the commander. However, the PAO is in a prime position to support such a long-term and far-reaching initiative as ecosystem management. The PAO frequently has direct access to the commander and has ready access to the media. The PAO, working with the natural resources manager, could be a link to maintain continuity for INRMP implementation between commanders. However, for their part, public affairs staff receive no training on reporting or communicating environmental issues other than limited guidance on emergency response. If an installation's public affairs staff are involved in supporting the natural resources program it is usually because of the personal interests of the staff rather than as a result of a directive from the commander or request from the natural resources program

3.6   Partnering

In almost all ecosystem management and land management guidance, partnering is identified as a key to success. Partnering with regional interest groups is identified as a means to develop a vision of ecosystem health for an installation, and also as a key to successful INRMP implementation. However, establishing and maintaining partners is not a priority for most installation natural resources managers. In general, partnering requires too much time and effort with little guarantee of success. As explained above under section 3.1, Aspects of Ecosystem Management, installations may be unable to develop partnerships due to their size and location.

Lack of time and lack of staff support can mean that natural resources managers are unable to take advantage of existing organizations and initiatives that could be the basis of a partnership. Approval by command to become an active partner is also often lacking. Installation command and even immediate environmental supervisors often fail to see the benefits of partnering. Command may not understand that partnering is a joint, consensus-building relationship — command may make unrealistic demands on the partners and this can adversely impact the development of positive relations that may be needed for successful ecosystem management.

Partners may also make unrealistic demands on installations — they may regard the installation as a deep pocket with extensive resources to be tapped. Some installations

indicated that when they have approached local groups there has been a sense of "what can the group get from the installation" rather than "what can be achieved jointly through a partnership." These are typical issues that arise when developing partnerships, but natural resources managers are neither trained nor qualified to resolve these issues and they certainly do not have the time necessary to address such concerns.

Because of these difficulties, partnering as a means to aid ecosystem management at the installation level is used infrequently by natural resources managers. Installations do use the technical support of other federal and state agencies (for instance, the U.S. Fish and Wildlife Service, the Natural Resources Conservation Service, state fish and wildlife divisions); however, these associations are usually not true partnerships. There is no sharing of common goals and there may be few mutual interests. In these cases, the association between the agency and the installation is limited to gaining a particular area of expertise or coordinating on a specific issue. Although it is difficult at the installation level to establish and maintain worthwhile partnerships, partnering is an important component of addressing the regional aspects of ecosystem management. Partnering should still be pursued but may be better achieved through regional DoD initiatives (e.g., major command, multi-service, multi-agency).

3.7   Short-Term Accomplishments Versus the Long-Term Vision

In general, the military does not recognize the value of a long-term vision such as that required for ecosystem management, and as a result there are no rewards for developing or following a long-term vision. Success is based on short-term accomplishments and installation commanders are judged on successes during their brief tenure at an installation. Most installations reported that their current commander has been in place for less than two years and that few will remain after two years. New commanders arriving at an installation have their own agendas and they usually concentrate their effort on high profile initiatives that can show demonstrated successes within their tenure as installation commander. However, ecosystem management implementation must proceed regardless of a commander's interests and agenda — ecosystem management is an ongoing, long-term initiative that demands the support of each consecutive commander. It must be given support and be funded on a regular basis and must not be changed or derailed mid-stream. Programs and operations identified as having responsibilities to support INRMP implementation must also be supported and funded for the long term.

Installation commanders' levels of interest in and understanding of ecosystem management vary greatly across the Services and within the Services. It is not clear whether this is a reflection of their overall training or a lack of training in environmental awareness and land management. Differences in attitude, understanding, and approach between consecutive installation commanders can lead to a roller-coaster ride for ecosystem management implementation. One installation commander may be very interested in the natural resources program and be a major supporter of ecosystem management. A subsequent commander may not be as interested and therefore

support and funding for ecosystem management initiatives may diminish under that commander.

4. Summary and Conclusions

The Office of the Secretary of Defense (OSD) can enhance readiness by employing ecosystem management to ensure the long-term quality of the natural resources entrusted to its care. To ensure that ecosystem management is fully implemented and integrated within the day-to-day operations of all military departments, DoD and the Services must:

Promulgate and disseminate Service-level policy and guidance.

Raise Natural Resource Management Offices higher in the installation chain of command, and enhance Regional Environmental Offices' (REO) ability to support installation managers and connect them with others in the region.

Move closer to the goal of the DoD Instruction, where ecosystem management principles become not just special projects isolated from the rest of an installation's environmental program, but rather where they form the basis of all environmental decisionmaking at the installation level. Require proposals for new or continuing special projects to demonstrate how they will accomplish or embody the ten principles in the Instruction, and require all INRMPs, as well as the projects proposed to implement them, to demonstrate how they will support the accomplishment of ecosystem management goals and objectives.

Train staff and leaders at installations and Regional Environmental Offices on the principles of ecosystem management as described in the existing DoD Instruction and the recommended new Service-level policy and guidance.

Empower natural resource managers with the authority to enter into agreements with other land-managing entities in the region.

Leadership at all levels is crucial to turn these recommendations into successful outcomes. All of these improvements must be accomplished in a way that is measurable and cost-effective. If DoD and the Services implement these recommendations, they will be on their way toward a more sustainable achievement of the readiness mission.

5. Findings and Recommendations

5.1   Findings

From the foregoing analyses, a number of key findings emerged. The study team identified lack of Service-level policy and guidance as a key factor. Installation natural resources staff identified organizational structure, lack of funding, and difficulties in securing staff as among the most significant impediments to effective implementation.

Finding #1: <u>DoD ecosystem management policy is not reflected in Service-level policy and implementation guidance</u>. While DoD ecosystem management policy provides a sound basis for establishing ecosystem management principles, these principles have not become pervasive in Service-level documents of the military environmental programs. Service-level policies, regulations, and guidance simply do not reflect current DoD ecosystem management policy.

Most installations have completed their first INRMP and are embarking on plan implementation without the benefit of Service-level policy and guidance relating to ecosystem management. No single military Service has any advantage here, and the problems are common to all the Services and to installations large and small alike.

In particular, guidance is lacking most in the areas of preferred practices for monitoring, adaptive management, and how to work with stakeholders to develop a shared vision of ecosystem health for the installation and surrounding region. The lack of Service-level policy and guidance in part explains why ecosystem management principles and practices are unclear to many installation natural resources managers. Some installation staff indicated they do not have a clear understanding of DoD's overall intentions regarding ecosystem management and there is no Service guidance specifically addressing it. At the same time, natural resources managers are in most cases successfully applying their own best professional judgment and most do not feel the lack of guidance is a significant impediment. However, the lack of clear guidance is leading to a fragmented patchwork of ecosystem management interpretations across DoD. These conditions lead to at least two sub-findings:

> <u>Installations surveyed have not partnered with regional stakeholders to establish a regional vision of ecosystem health</u>. Although establishing a vision in partnership with regional stakeholders is one of DoD's ten ecosystem management principles, this has not been realized primarily because the DoD policy has not yet been established in Service-level policies and implementation guidance. Interestingly, some regional entities have succeeded in getting together and identifying other environmental opportunities on a regional scale, but these activities have been managed through other "stovepipes" and excluded from the full understanding of ecosystem management. For example, many major metropolitan areas have developed regional air quality management entities, and some states have created regional watershed management authorities, but the regional air groups are managed through compliance dollars

under air programs, and similarly for watershed management. These are examples of regional ecosystem management thinking, but often fail to be recognized or funded as such.

Installation natural resources managers do not understand what adaptive management means. Ecosystem management is a process of continual reassessment to determine if management actions are leading to the intended goals and if they are meeting the intended objectives. Adaptive management supports that process through continual learning and application of knowledge gained so that management actions can be refined to keep progress towards goals and objectives on track. When asked about the relevance of adaptive management, installation environmental managers were bemused, saying it is impossible to work for a military environmental program without being skilled at adapting to last-minute budget cuts, new priorities, and other exogenous factors. But few if any understood the science-based intention of adaptive management that incorporates trial and error and experimentation in management decisions that must be made when incomplete scientific data is the best that is available.

Finding #2: Organizational issues impede adoption of ecosystem management principles. Staff at every installation visited expressed concern about organizational challenges, even though no organizational questions were included in the case study interview questionnaires. Resource managers stated across the board that the low status of the natural resources program prevents their efforts from being effective. Natural resource managers are low in the installation hierarchy, and implementation of ecosystem management projects requires approval through a chain of command that is unnecessarily long. As a result, partnering with other agencies and local landowners to achieve regional objectives requires coordination and approval from an impeding list of superior offices and decision makers, grinding many initiatives to a halt before they ever get started.

Finding #3: Ecosystem management is incorrectly viewed as a separate activity requiring its own line item in natural resources budgets. Many installation natural resource managers complained that they did not have adequate resources to fund ecosystem management initiatives because these initiatives compete for already scarce program management dollars. This view underscores the lack of understanding many resource managers possess about what ecosystem management is.

At some recent military conferences, participants often present status reports on various ecosystem management initiatives going on in different parts of the country, each funded by the DoD Legacy Resource Management Program or other earmarked funds as a special project or initiative. While these projects are important, conference organizers often neglected to introduce any discussion at all about how ecosystem management principles can be integrated into the day-to-day activities of all installation natural resource management programs. Similarly, there is seldom much discussion about the role of INRMPs in implementing ecosystem management (OSD policy), even at these special project sites. Ecosystem management will continue to languish as long

as the notion is perpetuated that it is some kind of special project that competes with other natural resource management requirements. *To the contrary, ecosystem management is a general management approach that should underlie and support all natural resource management funded initiatives.*

Among those installations attempting to persist in treating ecosystem management as a special project requiring special funding, many find that funding is hard to come by because when treated this way its priority for funding is very low. Failing to understand that ecosystem management is a general management philosophy rather than a special project, many installation staff interviewed said ecosystem management will never be fully funded as long as it must compete with compliance-driven budget requirements. Ecosystem management is not a compliance driven program, so under the current Class 0 through Class III budget designation the Services are hard pressed to even minimally support such special projects. Ecosystem management is usually rated a Class III concern, and even basic monitoring is not funded unless deemed compliance related.

Among installations attempting to fund ecosystem management as a special project, it is those installations lacking threatened and endangered species programs that have the most difficulty securing ecosystem management funding. The presence of a protected species can be used by some installations as a compliance-driven reason for funding an ecosystem management initiative. The irony emerges when one considers that ecosystem management is intended to be less reactive than traditional approaches, but it is only when the situation has degenerated to a compliance-oriented, reactive mode that funding is released. This approach works for installations with protected species compliance, but it is still reactive and still fails to integrate ecosystem management principles into the *entire* natural resources management program of the installation.

The Army's ITAM program can support ecosystem management implementation, but over-reliance on ITAM can impede the process if ITAM funding is withdrawn. In some cases this has happened, leaving managers to compete (usually unsuccessfully) for O&M funds. They would not have this problem if they understood ecosystem management as a general approach rather than a separate project.

The Legacy Resource Management Program was at one time a prodigious supporter of installation-level ecosystem management initiatives, but the program's budget is now very limited and is no longer able to support these interests. This is appropriate, since special projects were helpful in promoting the need for ecosystem-level thinking. However persisting in a "special project by special project" approach to ecosystem management will ensure its ultimate failure as an overall implementation strategy. DoD must move more assertively toward integrating ecosystem management principles into the overall effort to conserve natural resources on installations.

Ultimately, ecosystem management shouldn't be listed on installation natural resource management budgets as a separate line item. As a general implementation strategy,

ecosystem management principles should underlie all program activities, not just special initiatives.

Finding #4: <u>An adequate number of staff trained in ecosystem management principles is lacking</u>. Some installations may have sufficient funds but they are unable to get sufficient staff support for ecosystem management implementation. In many instances, there is only one natural resources manager for an entire installation with hundreds of thousands of acres to manage. The A-76 process and Reductions in Force have resulted in fewer staff remaining to accomplish an increased workload (although some may be unrelated to natural resources management). Even when funds are available to hire additional contractor staff support, natural resources managers in some parts of the country find it difficult to identify and retain qualified staff. New staff members require considerable training, and installations may suffer from a high staff turnover due to low pay and to limited opportunities for staff advancement. High staff turnover is an issue for both contractor support staff and for government civilian employees.

Finding #5: <u>Low organizational status of natural resource managers impedes effective communication with others on the installation and in the region, and furthers a reluctance among managers to partner with non-military entities in the region</u>. Installation natural resources managers identified difficulties in internal communications and considered them to be a result of the low organizational status of their programs. Internally, they cited a lack of any consistent means or channels of communication to key offices and organizations. Externally, they described how ecosystem management requires active partnering with entities beyond the fence line, which is often confused with mere information dissemination by installation Public Affairs Offices (PAOs). Frustration mounts when these differences emerge, and as a result PAO is either seldom involved with ecosystem management activities to the degree that would be helpful to resource managers or is involved in a way that is not helpful.

Although partnering is strongly encouraged by DoD policy to assist in INRMP implementation, none of the installations visited are using partners to jointly establish a shared vision of ecosystem health, to set goals, or to assist with either INRMP preparation or implementation. Some installations said they made efforts in these areas and found the public was simply not interested. They speculated that perhaps it was because the installation lacked any "charismatic mega-fauna" protected species. In other locations the efforts never made it past the installation's front gate due to a lack of installation command understanding, approval, and support.

5.2   Policy Recommendations

Recommendation #1: <u>Promulgate and disseminate Service-level policy and guidance</u>. Each Service should provide more direction to their installations on how the DoD ecosystem management principles are to be interpreted. The ten Principles outlined in DoDI 4715.3 are sound and are sufficient; however, Service-specific implementation guidance remains largely unavailable. Current Service regulations and guidance lack any detail on the ecosystem management concept and what it entails, and fail to explain

how ecosystem management principles are to be integrated into the day-to-day management activities through the INRMP.

Current DOD and Service leadership needs to embrace standing ecosystem management policy and emphasize that closer adherence to ecosystem management principals can proactively address concerns over the "encroachment" issue. It is through this renewed policy expression via interviews, speeches, and testimonies that the installation managers are provided the "policy cover" to take the necessary initiatives to implement ecosystem management.

Services should thoroughly disseminate their existing and new ecosystem management guidance to installations using a wide variety of tools. Successful institutionalization of ecosystem management by installations as the standard approach to land management requires an increase in education and awareness throughout the installation hierarchy, not just in the natural resources shop. The concept is equally critical to installation commanders, range managers, and environmental chiefs, since they must be cognizant and supportive of the integrated approach ecosystem management demands. Ecosystem management is not new to most natural resources managers but as an approach to land management, it is new to most other installation staff. The ten principles must become routine and institutionalized at the installation level.

Recommendation #2: <u>Raise Natural Resource Management Offices higher in the installation chain of command, and enhance Regional Environmental Offices in their ability to support installation managers and connect them with others in the region</u>. To better facilitate regional partnering, installation ecosystem managers must have enhanced access to installation leadership. In at least one installation (Fort Campbell, which was not a case study in this report), enhanced access was made possible through the creation of a Strategic Installation Learning Office (SILO).   A number of environmental program management successes at Fort Campbell were attributed to the role of the community planner within the Fort Campbell SILO. Fort Campbell had shown commitment to protecting mission by supporting this position. The SILO planner's location in the chain-of-command allowed him to inform and advise the garrison commander on regional land use planning issues, thereby overcoming an otherwise impossibly long chain of command between the natural resources manager and the garrison commander. The proactive approach led to Memorandums of Agreement (MOAs) with surrounding communities that will address regional land use planning issues.

Organizational change is difficult anywhere, especially in an entity as old and large as the military. But in this instance, a liaison at the REOs similar to the SILO at Campbell could help shorten the long chain of command between installation commander and natural resource manager. At some installations, such a liaison could provide direct links between installation programs and groups such as natural resources; range management; master planning; public works; public affairs; morale, welfare and recreation; and off-installation groups. The individual Services would determine which installations are considered key for the purpose of implementing ecosystem

management and which may benefit from establishing a liaison position. The liaison would have authority to interact directly with all installation programs and organizations and would be the key contact with partners and off-installation groups concerning land use and ecosystem management. It is important to note that this position should not be located with the office of Public Affairs. Rather, it should be filled by an installation land manager knowledgeable of the military mission and professionally trained in ecosystem management who can plan, interpret, integrate, and direct ecosystem management initiatives within and beyond the installation boundary. The liaison would also provide continuity from one installation commander to the next and would form the basis of seamless INRMP implementation.

An early draft of this report included a recommendation for creating a new position at every military installation called an installation ecosystem management liaison, which would report directly to the installation commander. The idea was that this new position would help gain greater visibility for ecosystem management by circumventing the long chain of command between the installation commander and the natural resources manager. However, it became clear that such a recommendation would require fiscal and human resources on such a large programmatic scale that it would be impossible to implement. Upon more careful consideration, this recommendation was removed in favor of suggesting a similar liaison at each of the REOs or the new IMA regional offices, thereby requiring only ten instead of hundreds of new staff, while at the same time focusing the ecosystem management at the regional level, where it ultimately belongs in the first place.

Since there are often multiple installations managed by multiple services in an ecological region, ecosystem management can be furthered dramatically by an enhanced role for ecosystem management within the existing DoD Regional Environmental Offices. Regional land management coordination conducted through the REOs could integrate various ecosystem management efforts being conducted by individual installations within given regions regardless of the military service to which they belong. Ultimately, each regional office should develop a regional land management plan that describes the roles and responsibilities of each military land parcel in the region and its avenues of interaction and cooperation with neighboring agencies and landowners. Each installation's INRMP would reflect its role in this larger, regional-scaled document that integrates ecosystem management into the broadest levels of the DoD's environmental management programs.

Recommendation #3: <u>Move closer to the goal of the DoD Instruction, where ecosystem management principles become not just special projects isolated from the rest of an installation's environmental program, but rather where they form the basis of all environmental decision-making at the installation level.</u> Require proposals for new or continuing special projects to demonstrate how they will accomplish or embody the ten principles in the Instruction, and require all INRMPs, as well as the projects proposed to implement them, to demonstrate how they will support the accomplishment of ecosystem management goals and objectives. Ecosystem management is a philosophical approach to land and water management, not a special initiative, and

therefore should require no specific funding mechanisms. The DoD Instruction establishes ecosystem management as official policy, with its ten principles clearly visible in all activities of the military environmental program. The Legacy Resources Management Program may have funded special ecosystem management initiatives in the past, but before the ecosystem management approach can be fully integrated into military programs it must be viewed not as a special project but as set of fundamental principles that underlie everything we do.

A proposed conservation, pollution prevention, or compliance project that does not demonstrate the principles of ecosystem management should be barred from receiving funding, even if the proposed action is categorized as a Class 0 or Class 1 initiative. To meet the terms of the DoD Instruction, all military environmental activities must incorporate the principles of ecosystem management at every turn.

Most installations have completed their first INRMPs and have requested funding already for the current 5-year Program Objective Memorandum. Starting with the next round of INRMP revisions and POM budget cycles, the ten ecosystem management principles should be included as "go/no-go" criteria for funding all installation environmental initiatives, including pollution prevention, compliance, and restoration projects. Similarly, these principles should be applied across all environmental media to include installation as well as regional air quality management partnerships, installation and regional watershed management efforts, and so on. If a proposed project or budget item fails to demonstrate how it will enhance ecosystem management on post, then it should be rejected for funding until it can be modified to support it. Doing so will ensure that installation natural resources are at a high enough level of quality indefinitely, thereby available indefinitely to sustain the training mission.

An earlier draft of this report recommended that creation of a "categorical exclusion" of sorts for ecosystem management projects in the Planning, Programming, and Budgeting systems of the services, thereby allowing these special projects to circumvent the typical Class 0 to Class III funding prioritization system that has traditionally hampered effective implementation of ecosystem management special projects. However, that earlier recommendation was later deemed inadequate because not only was it politically unlikely that such a circumvention could be effectively implemented, but also because it perpetuated the popular misconception that ecosystem management is some kind of special project and has nothing to do with the day-to-day management approach to total installation management. The revised recommendation better emphasizes the importance of making ecosystem management a measurable component of everything environmental that an installation does.

Recommendation #4: Train staff and leaders at installations and Regional Environmental Offices on the principles of ecosystem management as described in the new Service-level policy and guidance. Even with the "command and control" culture of the military, simply publishing a policy does not guarantee it will be adopted and implemented. The principles of ecosystem management and the ways in which ecosystem management can enhance readiness and sustainability must be

disseminated widely, beyond the natural resources manager to include installation and regional DoD leaders as well as soldiers and civilians in PAO, Judge Advocate General, Directorate of Engineering and Housing, and other elements of the garrison hierarchy.

One good source for ecosystem management-related information at the inter-service level is the Joint Stewardship Working Group (JSWG) of the Interagency Military Land Use Coordinating Committee (IMLUCC). The JSWG is currently focused on generating a handbook for installations on how to partner with others to manage withdrawn lands in support of the readiness mission.

Some regional offices are more advanced than others in their promotion of natural resources management at the regional level. In some regions, natural resources management is scarcely a program focus at all, but in others, it is an integral part of the regional office's mission. For example, the SE regional office is an active participant in the multi-agency Southeast Natural Resources Leadership Group, in the Southeast Ecological Framework Initiative, in the Fall Line Air Quality Study, and in an initiative to manage regional watersheds through an interagency partnership. All of these could be characterized as regional ecosystem management and should be encouraged across the range of DoD regional offices. The REOs meet monthly via teleconference and semiannually in person, providing opportunities to share the success stories from these activities and to further spread the idea that the Regional Offices can be a leading source of guidance in the implementation of regional ecosystem management among and between service installations.

Recommendation #5: Empower natural resource managers with the authority to enter into agreements with other land managing entities in the region. When hearing a call for better partnering with non-military entities to achieve military goals, many mistakenly assign related tasks to the nearest Public Affairs officer. The PAO is trained in dealing with the media to ensure that a unified message is disseminated to the public. But the information exchange needed to accomplish ecosystem management is not one-way, from the installation to the public. Regional partnerships for ecosystem management require working together to achieve a common vision of regional ecosystem health.

An example of the type of interaction needed is the recent initiative of U.S. Army-FORSCOM to develop Installation Sustainability Plans for each of its major installations. The plans include 25-year goals aimed at ensuring that environmental issues are managed in such a way over the long term as to ensure that the installation will be ecologically healthy enough to sustain training indefinitely. These goals are developed through a process that involves hundreds of stakeholders both on and off post, including state regulators, nonprofit advocacy groups, and private landowners sitting around the same table to develop goals that will minimize conflicts over increasingly scarce resources over the long haul, thereby helping to ensure the continued existence of the installation while on the path to sustainable regional growth.

Regional partnerships undertaken at the installation level can be complemented by parallel partnerships among regional stakeholders at the level of the DoD Regional Environmental Office.

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Appendix A: Gap Analysis

A. BACKGROUND

The Gap Analysis is a component of the evaluation of ecosystem management implementation on Department of Defense (DoD) lands. This gap analysis provides a baseline for the overall evaluation. The analysis focuses on "gaps" between DoD's key ecosystem management instruction (1996) and memo (1994), and the individual services' implementing regulations, guidance, and guidelines.

B. INTRODUCTION

On 8 August 1994, the DoD issued a memorandum stating that DoD would follow an ecosystem management approach for land use. The memorandum stated that ecosystem management (EM) should include: managing entire ecosystems; forming partnerships; seeking public involvement; using the best available scientific and field-tested information; and employing adaptive management techniques. The memorandum also states "ecosystem management will be achieved by developing and implementing integrated natural resources management plans (INRMP) and ensuring they remain current." The memorandum requires that "Policy developed by the services must be consistent with the principles of ecosystem management…." An attachment to the memorandum defines ten Principles of Ecosystem Management.

Subsequently, DoD published DoD Instruction (DoDI) 4715.3, *Environmental Conservation Program* (1996). This DoDI draws from the 1994 memorandum and provides direction to all military services for implementing ecosystem management. Ecosystem management is defined in enclosure 3 of DoDI 4715.3 as "A goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural process; is cognizant of nature's timeframes; recognizes social and economic viability within functioning ecosystems; is adaptable to complex changing requirements; and is realized through effective partnerships among private, local, state, tribal, and Federal interests." The instruction has eight enclosures including ecosystem management definitions (Enclosure 3), the ten Principles of Ecosystem Management (Enclosure 6), and General Contents of INRMPs (Enclosure 7).

Although initially presented in the 1994 memorandum and DoDI 4715.3, the requirement to prepare and implement INRMPs became law with the passage of the Sikes Act Improvement Act (SAIA) of 1997. Key changes to the Sikes Act as a result of the 1997 SAIA amendments include the following:

■ Replacing the term "cooperative plan" with "integrated natural resources management plan."

■ Emphasizing natural resources versus "fish and wildlife."

■ Requiring both preparation and implementation of an INRMP.

■ Requiring establishment of specific natural resources management goals, objectives, and time frames.

■ Requiring regular review of the INRMP not less than every 5 years.

■ Eliminating cost sharing and matching requirements of cooperative agreements.

■ Allowing funds under cooperative agreements to be expended over an 18-month period as opposed to within a given fiscal year.

■ Requiring that the public have an opportunity to comment on an installation INRMP.

The SAIA requires INRMP preparation and implementation but it has no specific reference to ecosystem management.

C. APPROACH

The study team identified sixteen elements from DoDI 4715.3 that they considered key to implementing ecosystem management. The elements were drawn from the natural resources section of the DoDI, the ten EM principles, and the general contents of an INRMP. These elements and the rationales for their significance are as follows.

1. General ecosystem management and the ten principles of ecosystem management — a definition and explanation of ecosystem management is critical if managers are going to successfully implement ecosystem management. Also, the ten principles specify the critical components of ecosystem management.

2. Critical definitions — ecosystem management conservation, biodiversity, INRMP, invasive species, and multiple use are important to understand in order to implement ecosystem management and are found in DoDI 4715.3 (Of equal importance are the terms adaptive management, baseline inventory, and monitoring but these are not currently defined in the DoDI.)

3. Manage ecosystems as opposed to individual species — this concept is a major paradigm shift and is central to ecosystem management.

4. Develop partnerships — stress the importance of partnerships on and off base and how they relate to performing ecosystem management.

5. Accommodate human use (i.e. multiple use) — ecosystem management requires consideration and integration of ecological, social, and economic issues.

6. Perform adaptive management (including monitoring and updating management procedures) — adaptive management is a component of EM that requires baseline inventories and monitoring.

7. <u>The INRMP as a vehicle to develop and implement ecosystem management</u> — it is important to explain the purpose of the INRMP.

8. <u>Perform annual review and five-year revision of the INRMP</u> — this is a requirement of DoDI 4715.3.

9. <u>Maintain and restore native ecosystems</u> — this supports the nation's policy on stewardship of federal lands.

10. <u>Perform inventories</u> — critical to ecosystem management and adaptive management.

11. <u>Integrate INRMP with all installation plans</u> — ecosystem management will be unsuccessful if integration is lacking.

12. <u>The INRMP must present history and current status of natural resources</u> — historic and current perspectives must be known to develop EM goals and objectives.

13. <u>The INRMP must list all legal requirements pertinent to natural resources</u> — must comply with the law (federal, state, and/or local).

14. <u>The INRMP must present procedures and priorities for managing natural resources</u> — successful implementation requires prioritization.

15. <u>The INRMP should identify procedures for ongoing identification, maintenance, and enhancement of natural resources</u> — this identifies ecosystem management and INRMP implementation as dynamic processes.

16. <u>The INRMP should promote the beneficial use of natural resources</u> — identifies that natural resources can be used in the public interest.

The services' natural resources regulations, guidance, and guidelines were reviewed to determine if these sixteen elements are addressed. The regulation, guidance, and guidelines reviewed included:

- ARMY
    - Army Regulation 200-3, Natural Resources—Land, Forest and Wildlife Management, 28 February 1995; and
    - Guidelines to Prepare Integrated Natural Resources Management Plans For Army Installations and Activities, April 1997.

- ARMY NATIONAL GUARD
    - National Guard Bureau All States Letter (Log Number P00-0039) Integrated Natural Resources Management Plans, 15 June 2000.

- NAVY
  - OPNAVINST 5090.1B, Chapter 22: Natural Resources Management, 9 September 1999; and
  - Guidelines for Preparing INRMPs for Navy Installations, September 1998.

- AIR FORCE
  - Air Force Instruction 32-7064, 1 August 1997.

- MARINE CORPS
  - Handbook for Preparing Integrated Natural Resources Management Plans for Marine Corps, November 1999; and
  - Marine Corps Order 5090.2A Environmental Compliance and Protection Manual, Chapter 11: Natural Resources Management Program, 1 July 1998.

The Air Force Instruction is currently under revision and the revised draft versions were not included in the gap analysis. However, based on a review of the revised draft DODI 4715.3, the team anticipates that the revisions would not significantly affect the gap analysis.

The individual service natural resource documents used in the gap analysis include instructions, regulations, guidance, and guidelines. While some are not strictly considered service policy (e.g., Guidelines to Prepare Integrated Natural Resources Management Plans For Army Installations and Activities), they do provide standard processes and formats for installation INRMP development and implementation.

D. FINDINGS

Although all the regulations, guidance, or guidelines contain some of the key elements drawn from DoDI 4715.3, none addresses all of these components. This can be explained in part for AR 200-3 because it predates the issuance of DoDI 4715.3. However, it was included in the gap analysis and was critiqued to determine if it captures some of the elements of ecosystem management. The gap analysis found five main elements lacking or insufficient in most guidance: (1) ecosystem management, (2) partnerships, (3) inventorying, (4) monitoring, and (5) adaptive management. The absence of or lack of reference to these key elements in the individual services' guidance makes it more difficult for natural resources managers in the field to seek and secure funding and command support for projects and actions related to these key elements.

Installation natural resources managers are required to implement ecosystem management. The lack of a frame of reference for ecosystem management puts installation natural resources managers in a position of having to guess (albeit best professional judgment) as to their service's overall intent for and support of ecosystem management. Ecosystem management is briefly mentioned in most of the guidance documents but they do not provide a definition of ecosystem management. There is no detail provided on ecosystem management and no information on how and why an ecosystem approach should implemented.

Partnering, according to DoDI 4715.3, is considered "necessary to assess and manage ecosystems that cross political boundaries" and is included in the ecosystem management definition. However, across the services information on partnering is lacking.

The need for initial baseline inventories and use of inventories in overall adaptive management is another aspect of ecosystem management that cannot be overlooked but which is mentioned only briefly in the guidance/regulations. No information is provided on how to use inventories for ecosystem management. Inventories, sometimes referred to as baseline inventories, are imperative for successful monitoring programs. Monitoring, although stated as a component of ecosystem management as presented in the ten principles, is poorly documented across the services also.

Just as baseline inventories are a requirement for monitoring, so monitoring is a requirement for adaptive management. However, adaptive management is the least addressed of these three topics but requires the most explanation. There is no linkage presented in the guidance between developing ecosystem management goals and objectives, and adaptive management. To be successful, managers implementing ecosystem management must understand how to perform true adaptive management, as opposed to ad hoc management.

E.   GAP ANALYSIS FINDINGS TABLES

The gap analysis findings for each service's instructions, regulations, guidance, and guidelines are contained in the following four tables. Prior to each table there is a summary paragraph of the findings for each service.

Key elements not adequately covered in Army regulation and guidance include critical definitions, requiring annual and five-year updates, maintaining and restoring native ecosystems, and listing legal requirements within an INRMP. The following key elements are mentioned at some level of detail in at least one of the documents but require more explanation. Those include partnerships, accommodating multiple uses, information on ecosystem management, managing at an ecosystem scale, and adaptive management. For example, there is no explanation of what a multiple use is or why it is important. Inventories, INRMP as a vehicle for ecosystem management implementation, goals and objectives, and monitoring and how they make up adaptive management is lacking also. Army regulations and guidance as a whole contain enough information on some key elements such as inventories, planning for agriculture and timber management, and integrating all base plans. The following tables provide details on the gaps found in each individual regulation, guidance, or guideline.